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NEW SPACESUIT--A SPACE "MINI-HOUSE"

by

Ljubo Izvoric



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## NEW SPACESUIT--A SPACE "MINI-HOUSE"

Ljubo Izvoric

The news about the various accomplishments of the Salyut-6 orbiting space station mentioned, among other things, that the Soviet cosmonauts walked in outer space in an improved spacesuit designed in a new way. Some reporters have named this spacesuit the space "mini-house", "mini-vessel" and so on.

As we know, the basic purposes of the spacesuit are as follows: to form a microclimate suitable for the human organism (pressure, gas composition, humidity, temperature--which is a very complicated situation), to protect the cosmonaut and his equipment from extreme vacuum and solar radiation, to assure removal of the heat produced by a human body, which is not really a simple matter under space conditions, etc.

In addition the spacesuit itself must be absolutely airtight, strong, light, relatively small and easy to put on rapidly; the cosmonaut must be able to move easily in it; if possible, cosmonauts should be able to adjust it for use at different altitudes; it should be easy to repair, and individual elements should be easy to replace.

These are the actual requirements. It is also desirable for these characteristic cosmonaut "garments" to be made as far as possible in the form of a semi-solid spacesuit to be used for walking in outer space. Its basic distinction is that it has a strong metallic framework, a kind of breastplate like that of ancient knights.

This metallic body forms a simple unity with a helmet and knapsack (backpack) on the back (containing a central system for maintaining the cosmonaut's vital functions). The spacesuit is not put on, but stepped into from behind through a "gate" in the panoply, and the above-mentioned "knapsack" forms an airtight seal.

The advantages of this improved space suit are really wonderful. A cosmonaut can get into it or out of it in only 2 or 3 minutes, and without any help. It is very strong and use-oriented. A "control panel" is situated on the chest, immediately below the arms, on the solid breastplate of the spacesuit.

Since the "knapsack" is the central system for maintaining the vital functions and the airtight closure in the metallic frame, external tanks and tubes are no longer present; they have been kept only on the "Apollo" spacesuit.

This spacesuit is very safe and airtight, and smaller, soft pressure pouches are found around the circumference in an active state, i.e., when they have been pumped up. At definite locations the spacesuit has curves corresponding to the joints of the body with soft, hermetic hinges; these enable the cosmonaut to be as mobile as possible and adaptable to the work at hand. We may note in passing that the cuffs have a small attached mirror which can be used as a rear view mirror.

The spacesuit has an autonomic system of a regenerative type to insure that the cosmonaut's vital functions are maintained. This consists of a series of connected systems (to provide oxygen, to regulate pressure, to provide ventilation and to regulate the gas composition and purify it with a filter, to regulate heat, to control electrical equipment and apparatus, to maintain radio contact, etc). In addition it is especially significant that the basic operating systems augment safety by having backup systems.

Heat regulation in the spacesuit is achieved by means of a network combined with automatic valves in thin plastic tubing through which cooled water circulates. This makes it possible to maintain normal heat, even under heavy physical loads! In addition, as in other spacesuit systems, a kind of "thermos made of several layers" assures protection against the effect of the enormous difference in outside temperature (which can amount to 300°C in space), and material and colors which completely reflect strong solar radiation are employed.



The new spacesuit is not put on, but is stepped into as through a gate.

Special light filters have been installed in the helmets to protect the cosmonaut's eyes and face from excessive ultraviolet and infrared (heat) rays: at the same time they make good visibility possible.

The entire semisolid spacesuit is adjustable to every cosmonaut without regard to body size and can be used many times over to go out into outer space. All of this is of great significance when several cosmonauts change places while work is being done on the orbiting station.

As this spacesuit has a "gate" through which it is entered, a "window" one can look through, and a conditioning system, it can be seen that it does not differ essentially from a house made to be lived in.

It is anticipated that this mobile "space house" has a great future, and technologists, materials experts, chemists, electronic specialists and experts from other fields of technology will continue to improve it.